

Title: Perimeter Playground

Brief Overview:

The students will use real-life experiences to discover perimeter. The teacher will read aloud Spaghetti and Meatballs for All by Marilyn Burns to help them develop a visual awareness of perimeter. The students will utilize problem-solving strategies and their understanding of perimeter to create a “fantasy” playground.

NCTM Content Standards:

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- Understand meanings of operations and how they relate to one another.
- Compute fluently and make reasonable estimates

Measurement

- Understand measurable attributes of objects and the units, systems, and processes of measurement.
- Apply appropriate techniques, tools, and formulas to determine measurements.

Grade/Level:

Second/Third Grade

Duration/Length:

Four days (60 minutes each day)

Student Outcomes:

Students will:

- Develop the concept of perimeter by counting units around a picture or geometric figure
- Estimate and find the perimeter of geometric figures and pictures on a grid
- Explore what happens to measurements of a two dimensional shape.

Materials and Resources:

- Spaghetti and Meatballs for All by Marilyn Burns
- grid paper
- color tiles
- centimeter cubes
- Cuisenaire rods
- clipboards
- math journals
- worksheets
- calculators

Development/Procedures:

Lesson 1

Preassessment – Use SR1 “Perimeter” to preassess what students already know about perimeter. Encourage students to discuss what they think perimeter is, what it looks like on a drawing, and one question about perimeter.

Launch – Have students participate in a classroom walk around the border of the room and use their hands to explore the borders of their desk to discover the concept of perimeter. Teacher will demonstrate how to use nonstandard units of measurement to find the perimeter of his/her desk. Measurements will be recorded on the overhead, added, and then checked utilizing the calculator. Answers will be recorded in students’ math journals.

Teacher Facilitation – Each cooperative team will be given a basket with color tiles. Use SR2 a and b to facilitate finding perimeter utilizing color tiles. Teacher will demonstrate how to cover the first polygon with color tiles, estimate the perimeter and then count the perimeter of the shape. Encourage students to revisit SR2 a and b to determine responses for SR3 which is a color tile measurement data sheet.

Student Application – Students will continue to use color tiles to cover the remaining seven polygons on the SR2 a and b sheets with Color Tile Measurement activity. Use SR3 to record estimation and actual perimeter of each shape.

Embedded Assessment – Use teacher observation sheet TR4 to:

- Estimate perimeter of polygons
- Find the actual perimeter of polygons
- Count by whole numbers

Reteaching/Extension – Distribute SR 5 “Roll a Polygon Game Sheet” to each group of students. Students will work with a partner to play “Roll a Polygon” game. Each cooperative pair will be given two colored number cubes. The red cube will represent the width using snap cubes. The blue will represent the length. After each roll, students must record their numbers on the polygon game sheet, construct and diagram the snap cube array.

Lesson 2

Preassessment – Distribute geoboards and rubber bands to each child. Students must be informed that the raised lines on their geoboards indicate unit lengths. They will be asked to make 3 closed shapes with no diagonal lines.

Launch-Teacher will read the story, Spaghetti and Meatballs for All, by Marilyn Burns to students to help them develop a visual awareness of perimeter.

Teacher Facilitation-use shapes created on geoboards from preassessment activity to determine the perimeter of each polygon. Teacher will select a student created polygon and will model it on

the overhead. Students will figure out the perimeter of the selected polygon. Then another student created polygon will be used on the overhead to reinforce the skill. Teacher will ask question such as, “Is there a polygon that is larger than 16 units?” Hand out SR6 Geoboard Dot paper. Complete squares one, two, and three as a whole class activity. We will be using paper and pencil to create polygons which have right angles, and closed shapes.

Student Application- Students will independently complete the nine remaining geoboards. They must create closed shapes with right angles.

Embedded Assessment-Use teacher observation sheet TR4 to:

- use geoboards and rubber bands to make polygons
- record the perimeter of shapes
- compare the perimeter of different shapes

Reteaching/Extension-Hand out SR7 geoboard perimeter sheet. Students will measure the perimeter of given polygons.

Lesson 3

Preassessment – Distribute sets of Cuisenaire Rods to each cooperative group. Direct each student to select one rod from the basket. They will then determine the perimeter of the selected rod by utilizing the white/cream rod which symbolizes one centimeter.

Launch-Students will be asked, “Is there any easier way to figure out the perimeter of polygons?” Teacher will direct student attention to pull from previously taught strategies such as counting doubles or multiplication. ($2L + 2W = P$) Hand out SR8 Playground Perimeter Survey Sheet and explain directions to the children.

Walk outside to the playground with the students and walk the perimeter as a class. Point out North, East, South, and West. Students will use clipboard and survey sheet to independently walk the playground perimeter again while measuring each side in a non standard form of measurement (their feet). Students need to be reminded to stop after counting each side of the playground and record the measurements on the survey sheet. They will complete all four sides, total the measurements, and then use a calculator to check for accuracy.

Teacher Facilitation- Have students participate in a game called “Connect the Rods Game”. Use TR9 to foster the students to:

- calculate the perimeter of shapes
- discover that using the same number of Cuisenaire rods that have different shapes can be made
- discover that different shapes with the same number of rods produce different perimeters.

Student Application-Each cooperative team will be given a basket with color tiles. Use TR10 to copy and cut out created sentence strips. Have the students create polygons depending on selected

sentence strips. For example, 2 yellow and 4 red Cuisenaire rods will be selected from basket to create a polygon on centimeter grid paper (SR11). The students will:

- Place the Cuisenaire Rods on the grid paper so that they lie within the lines of the centimeter grid paper and every rod must touch at least one centimeter of another rod.
- Find the perimeter of their polygon by counting the distance around their student created polygon.
- Create and share as many polygons as possible in fifteen minutes.

Embedded Assessment-Use teacher observational checklist TR4 to:

- use Cuisenaire rods to make polygons
- make right angle polygons
- use centimeter Cuisenaire rod to measure perimeter of created polygons
- use counting by whole numbers

Reteaching/Extension- Hand out SR 12 Fantasy Playground Plan to each student. Use centimeter cubes to measure the distance around the playground equipment. Complete see saw example together as a class. They will write number sentences showing repeated addition or multiplication. For example, $6+3+6+3 = 18$ centimeters. See TR13 for “Fantasy Playground Plan” activity sheet answers.

Summative Assessment: Students will be given a blank centimeter grid paper SR14 to create their playground. They will have to select three equipment items from SR15 to properly place on the paper. They must include the measurements of two sides of the equipment, one for the length and the other for the width. They should then use the taught formula to calculate the perimeter. Students will write an entry SR16 in their math journals responding to the following writing prompt: Explain how to calculate the perimeter of the three items on your playground. Be sure to use mathematical terminology and include number sentences.

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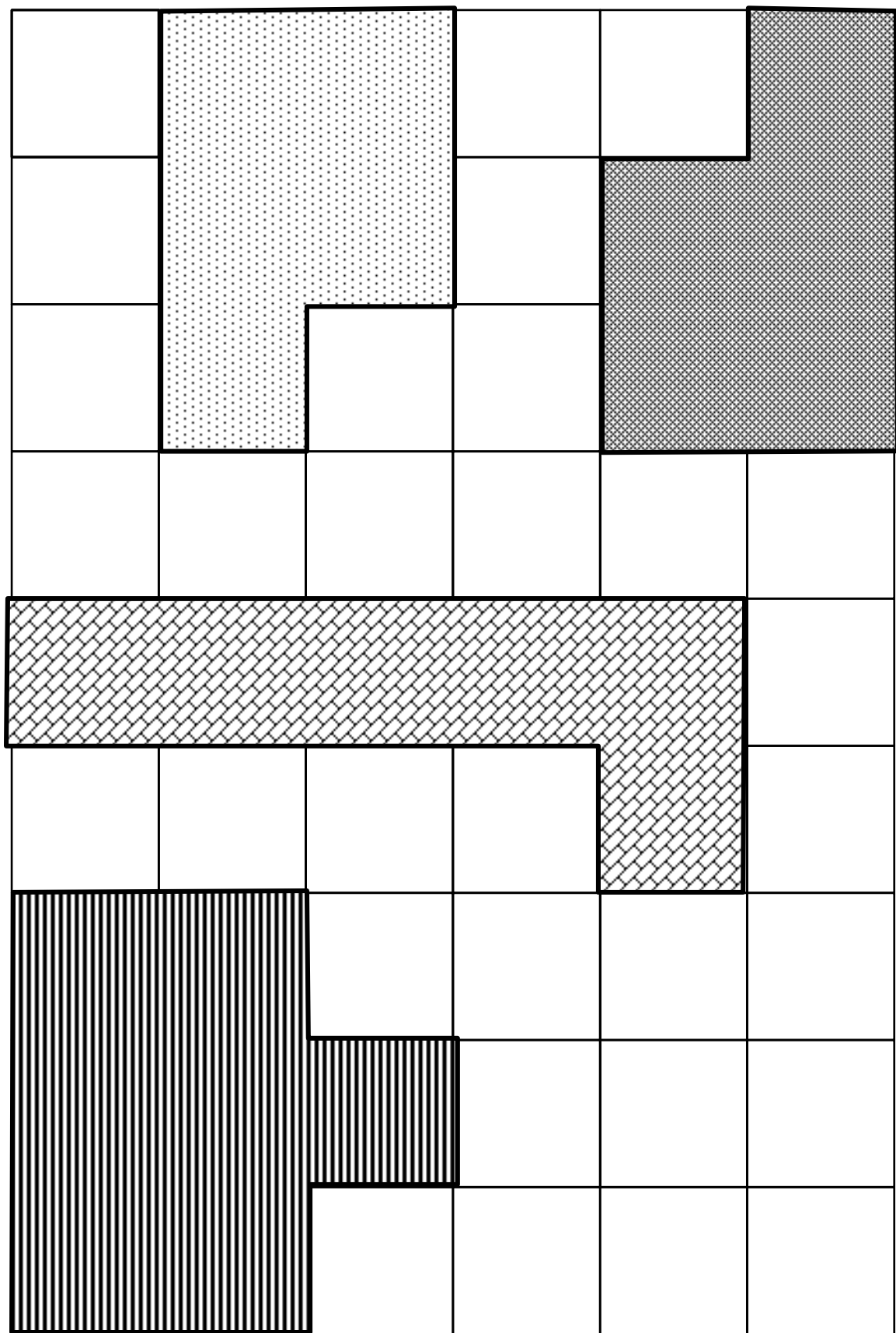
I think that perimeter is ...

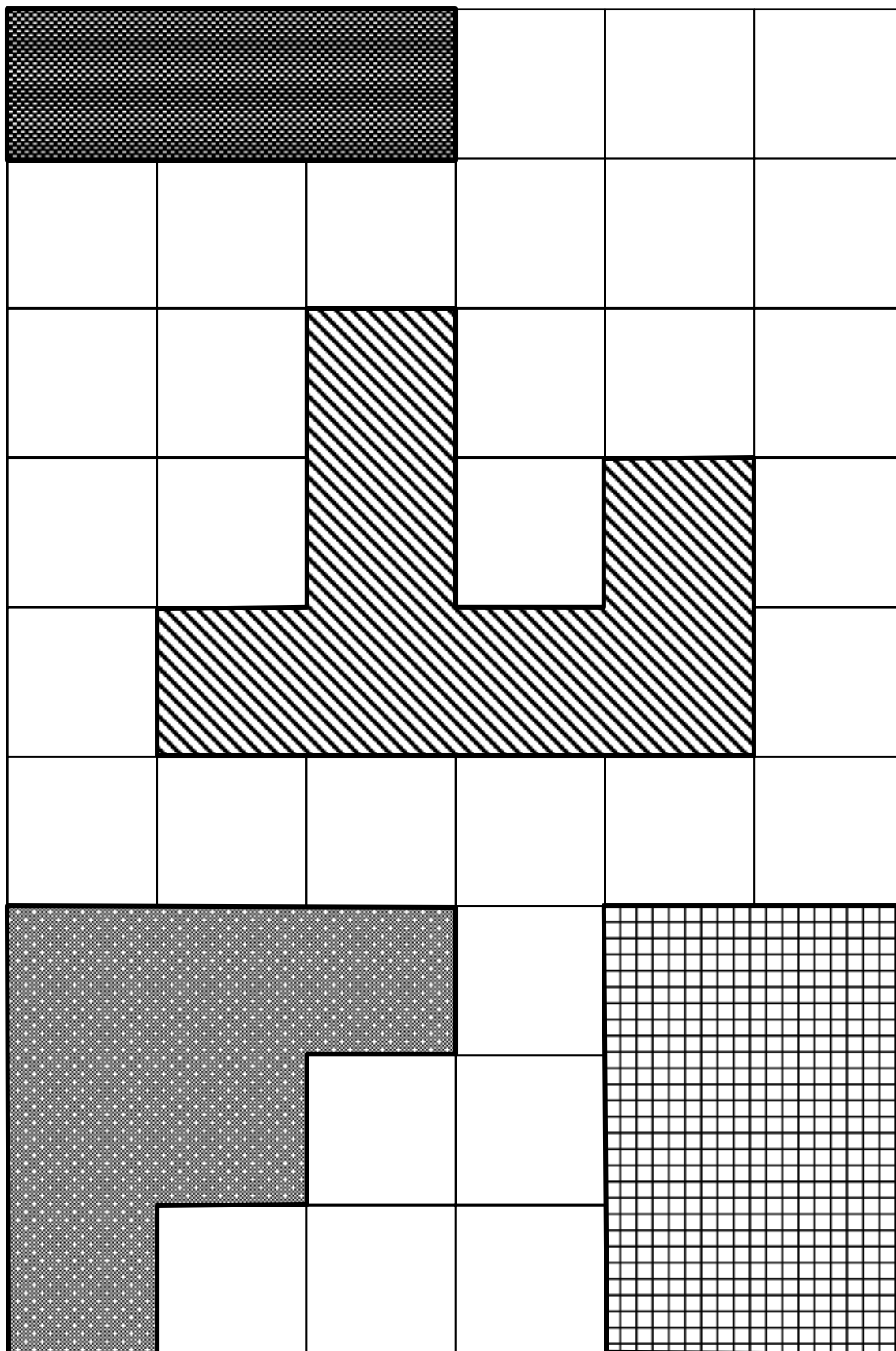
My drawing shows the perimeter of...



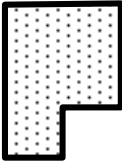
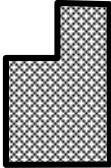

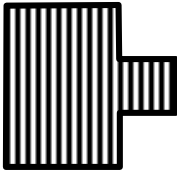
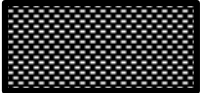

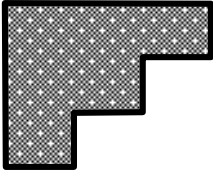
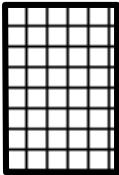
Perimeter

One question I have about perimeter is...





Color Tile Measurement Data Activity Sheet

Shape	Estimate	Actual
		
		
		
		
		
		
		
		

“Roll a Polygon Game Sheet”

Roll Number	Red Roll	Blue Roll	Perimeter	Diagram of Shape
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

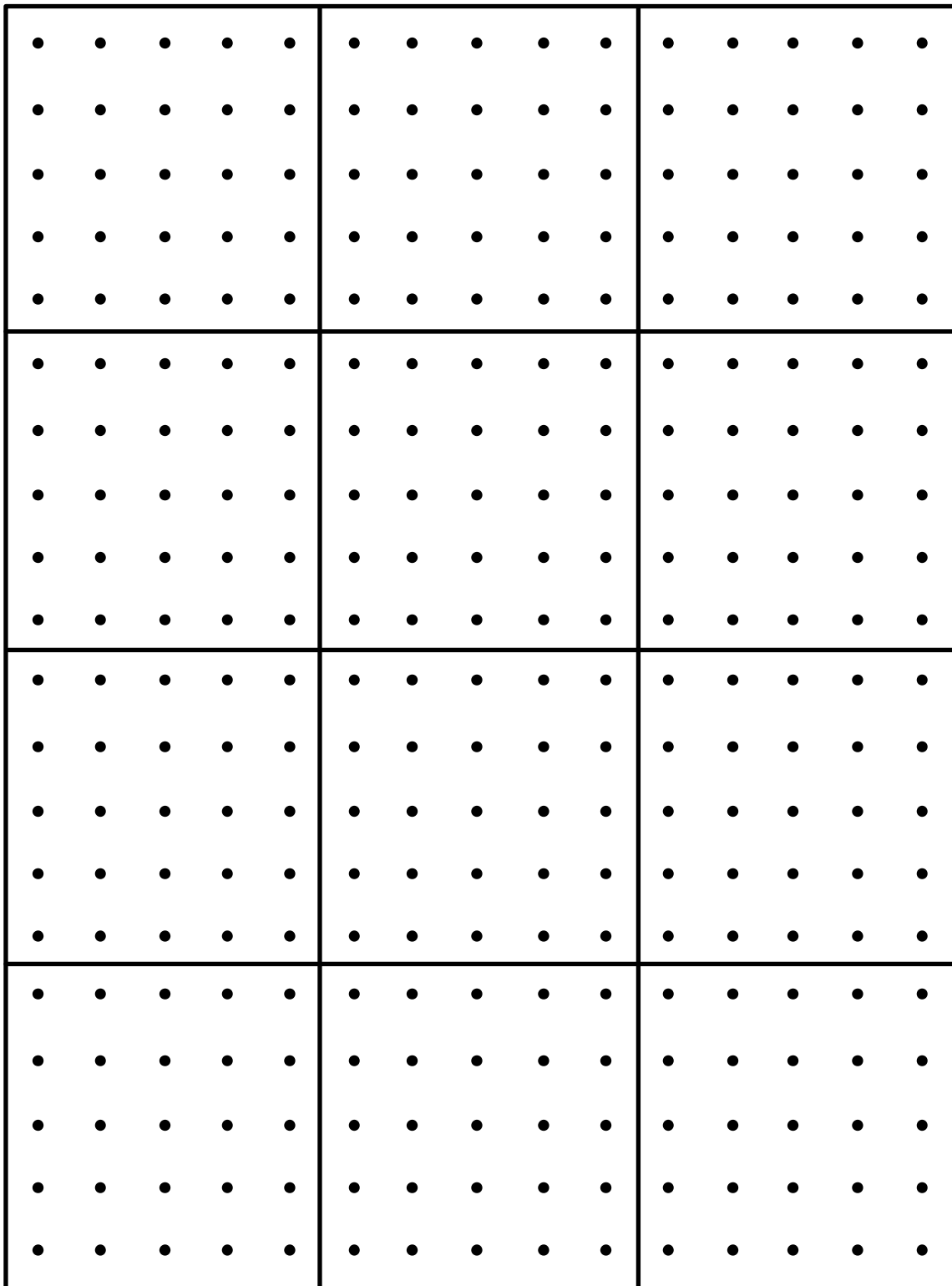
Teacher Observational Checklist

Teacher Resource 4

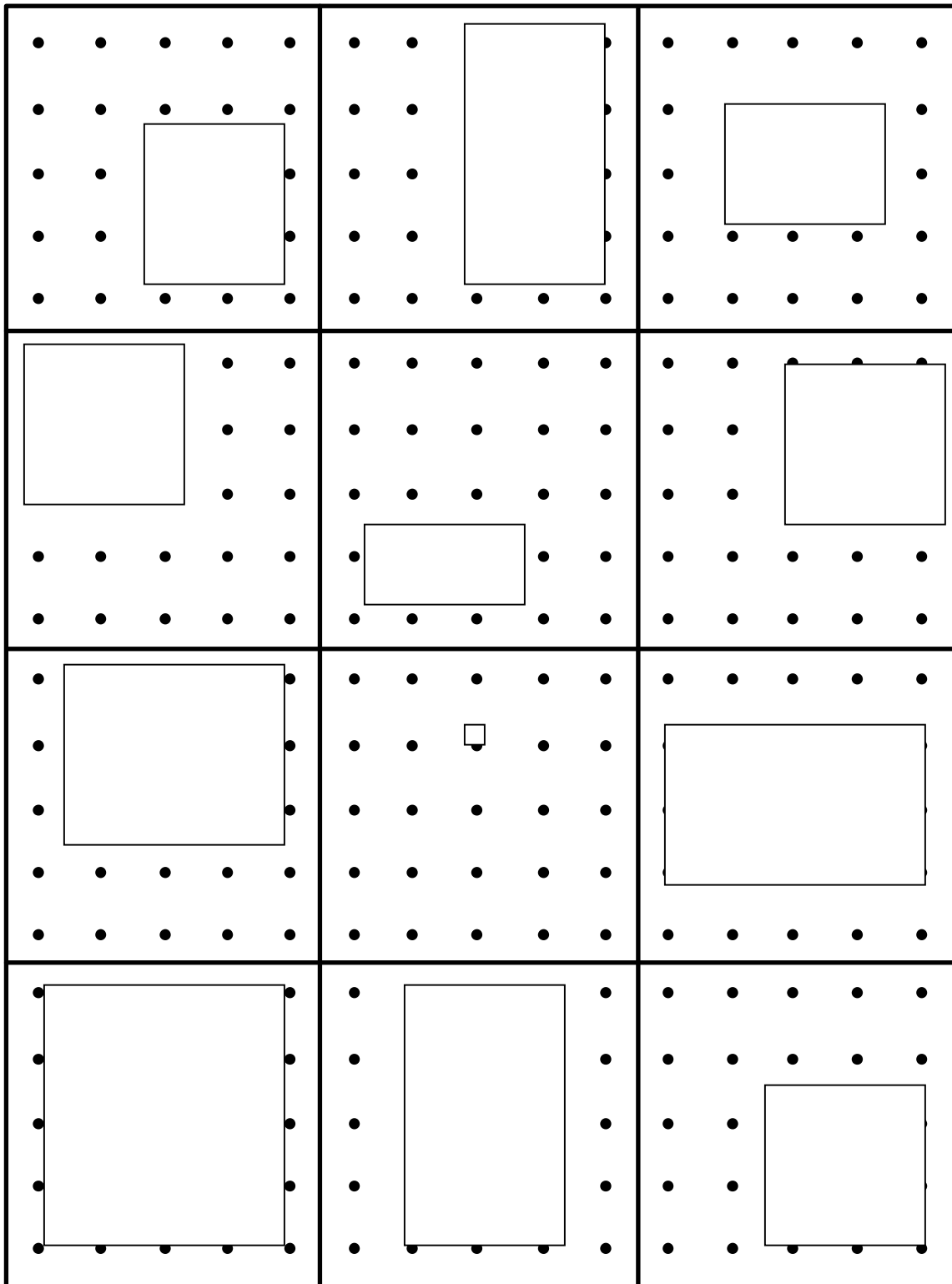
Outcomes/ Criteria	Name	Name	Name	Name	Name	Name	Name

Anecdotal Information / Evaluation Scale

Geoboard Dot Paper



Geoboard Dot Paper Polygon Activity



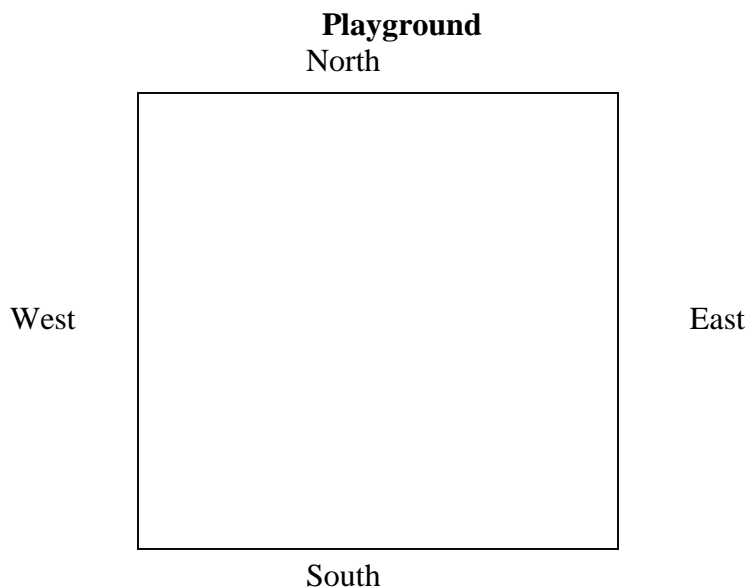
Name _____ Date _____

“Playground Perimeter Survey Sheet”

Directions: Students will walk the border of the school playground to measure the perimeter in feet. Be reminded that due to shoe sizes, this is a non standard form of measurement. Record each side on your survey sheet. Once you finish all four borders, you will add up your measurements with paper and pencil. Calculators will be provided to check your answer. Remember to label your units in feet.

Sides	Cardinal Direction	Number of feet (non standard)
1.	North	
2.	South	
3.	East	
4.	West	

Grand Total in feet



“Connect the Rods Game”

Overview

The students will be given a teacher selected number of Cuisenaire Rods to make a polygon utilizing the same number of rods. The students will:

- calculate the perimeter of shapes
- discover that by using the same number of Cuisenaire rods, different shapes can be made
- discover that different shapes with the same number of rods produce different perimeters.

Introduction

The students will select the indicated number of Cuisenaire Rods to place on centimeter grid paper. They must ensure that the rods connect and use a crayon or colored pencil to trace around their “polygon”. The students will:

- remove Cuisenaire rods from outlined grid paper
- use the centimeter grid lines as a unit of measurement to count the perimeter
- share their masterpieces with their cooperative teammates.

Rules

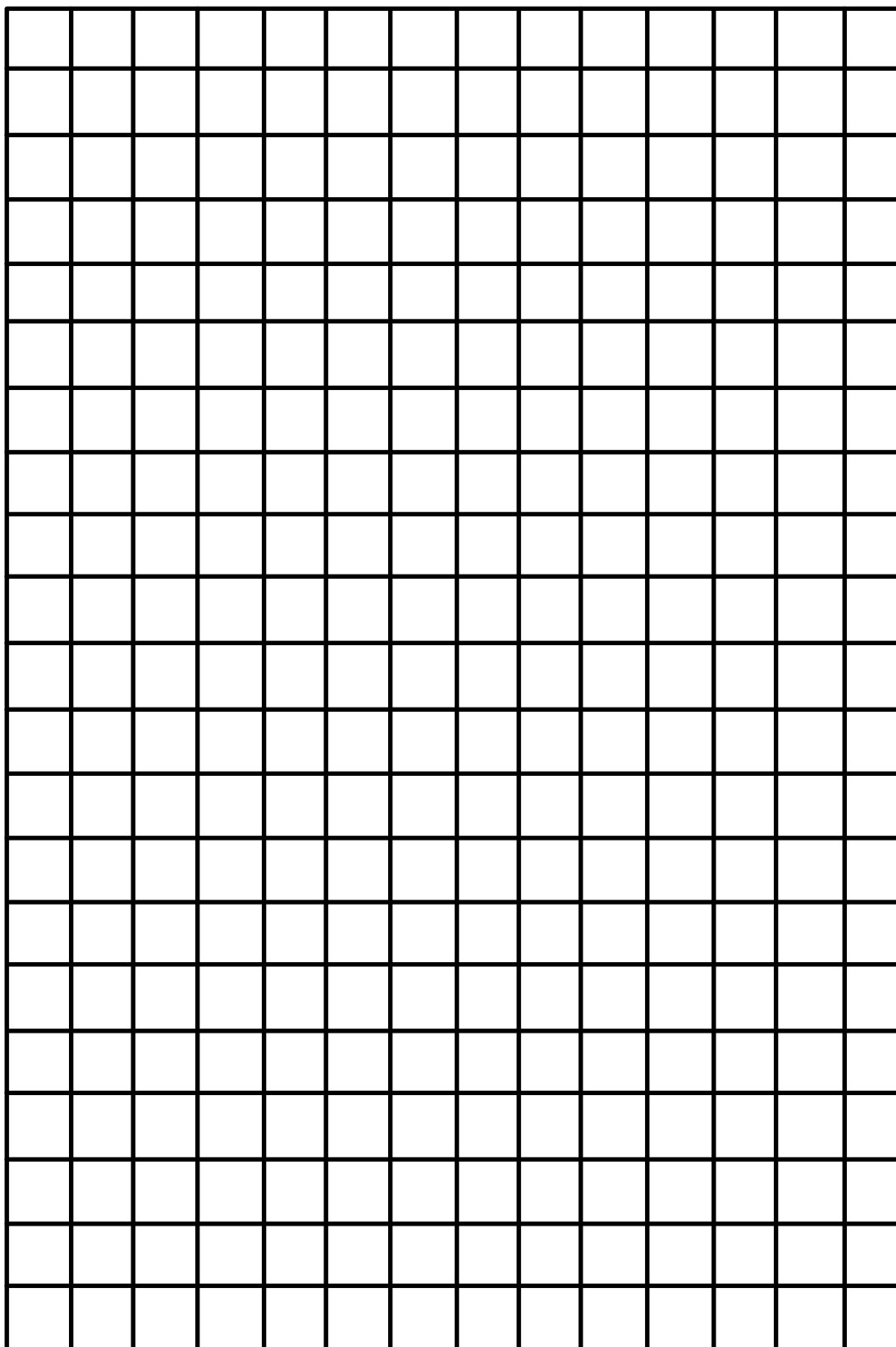
The students will:

- place the Cuisenaire Rods on the grid paper so that they lie within the lines of the centimeter grid paper and every rod must touch at least one centimeter of another rod.
- Find the perimeter of their polygon by counting the distance around their student created polygon
- Create and share as many polygons as possible in fifteen minutes.

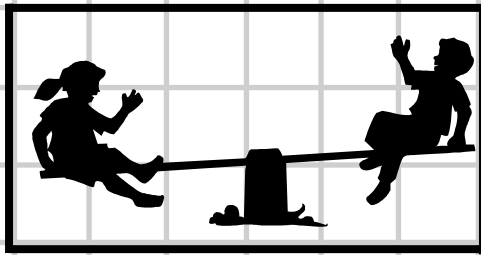
Cuisenaire Sentence Strips Activity

2 yellow, 4 red
5 green, 3 pink
1 orange, 1 light green, 2 red
2 brown, 1 red, 1 white
3 blue, 3 yellow
4 black, 1 orange, 2 red
4 pink, 4 white, 4 red
10 white, 6 red
1 black, 1 brown, 1 green
2 yellow, 2 pink, 2 light green
3 orange, 2 white, 1 red
5 black, 3 orange, 1 blue
6 yellow, 4 green
5 red, 8 white

CENTIMETER GRID PAPER

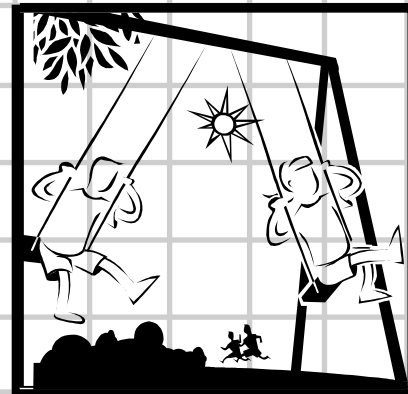


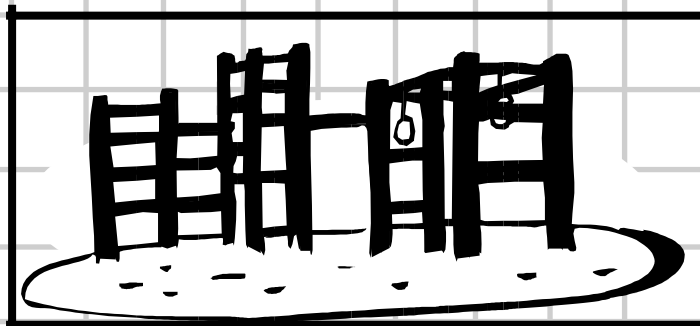
Fantasy Playground Plan



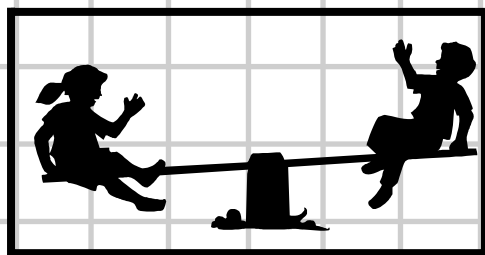








Fantasy Playground Plan



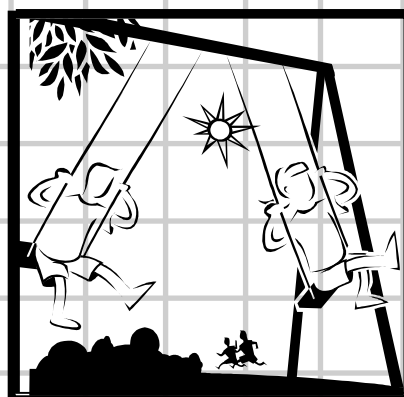
18 centimeters



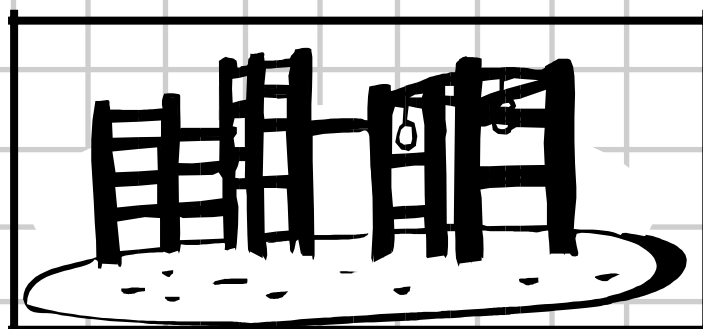
20 centimeters



16 centimeters

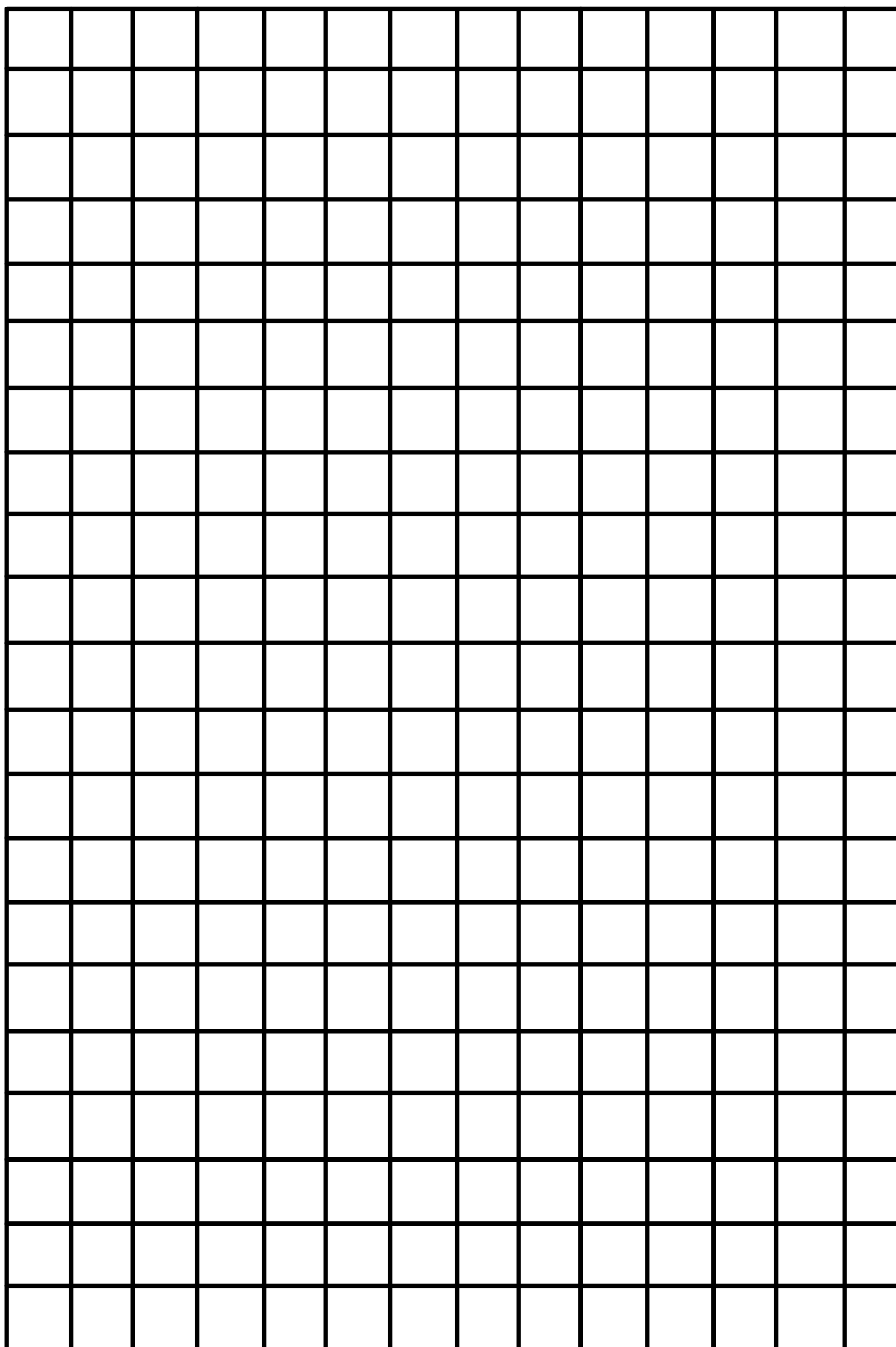


20 centimeters

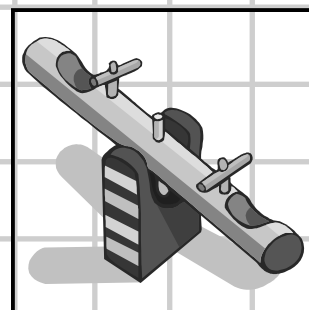
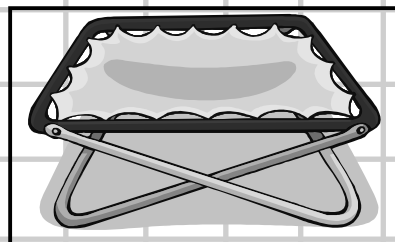
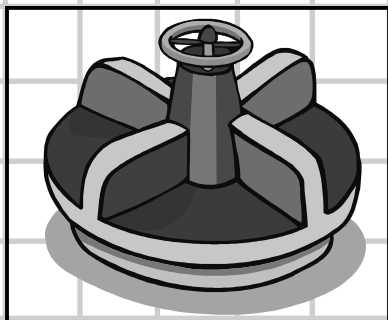
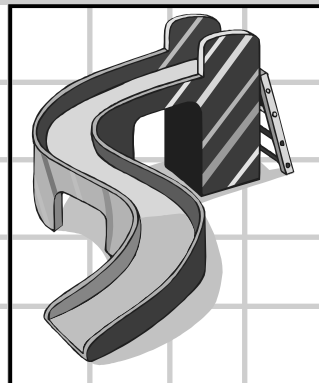


26 centimeters

“Student Created Fantasy Playground”



Student Manipulatives to Create Fantasy Playground



Name _____ Date _____

Summative Perimeter Journal Entry

In your journal, you must explain how you decided which three pieces of equipment you included on your “fantasy playground”. Please include the steps of how you calculated the perimeter of each playground apparatus. Mathematical terminology and number sentences must be included.